Diabetes Brief

What is Diabetes?

Diabetes mellitus is a disease of abnormal carbohydrate metabolism, in which the level of blood glucose, or blood sugar, is above normal. The disease occurs when the body is unable to produce or use insulin, a hormone that helps move glucose from the blood into other cells throughout the body. Untreated or uncontrolled diabetes can cause heart disease, blindness, kidney failure, and lower-extremity amputations, and can be fatal.

Diabetes ranked as the seventh leading cause of death for all ages in 2006.[1] As of 2008, approximately 24 million people in the United States have diabetes; nearly 6 million of whom are undiagnosed.[2]

There are several types of diabetes[1]:

- *Type 1 diabetes* occurs when the pancreas is completely unable to produce insulin. It occurs most often in children; in this autoimmune disease, the immune system destroys the insulin-producing cells in the pancreas. People with this type of diabetes must take insulin daily. Type 1 diabetes accounts for 5-10% of all cases of diagnosed diabetes and is not preventable.

- *Type 2 diabetes* occurs when the body cannot produce enough insulin to remove glucose from the blood, or when the body does not use its insulin properly (such as cells becoming resistant). It can occur at all ages, and is often associated with obesity. Type 2 diabetes accounts for 90-95% of all cases of diabetes, and is preventable.

- *Gestational diabetes* occurs only in pregnant women, and usually resolves after pregnancy. Approximately 5-10% of women with gestational diabetes remain type II diabetics post-pregnancy. Overall, women with gestational diabetes have a 20% to 50% chance of developing type II diabetes within 5 to 10 years of their pregnancy.

- *Pre-diabetes* occurs when glucose levels are elevated in the blood, but not as high as someone who has diabetes.

Risk Factors for Type 2 Diabetes

Demographic Risk Factors

- *Age*
  - Type 2 diabetes is associated with older age, although it is increasingly diagnosed in children and teens.[1]
- *Family History*
  - Individuals with first degree relatives who are diabetic are at greater risk for developing diabetes. [1]
- *Race/Ethnicity*
  - Hispanic or Latino Americans, American Indians, and some Asian Americans, Native Hawaiians or Other Pacific Islanders are at particularly high risk for Type 2 diabetes.[1]

Social and Behavioral Risk Factors

- *Pre-diabetes*
  - Having pre-diabetes is associated with an increased risk for developing Type 2 diabetes.[1]
- *Poor Diet and Physical Inactivity*
  - Individuals with a poor diet and lack of regular physical activity are at greater risk for developing Type 2 diabetes.[1]
- *Overweight and Obesity*
  - People who are overweight and/or obese have a greater risk of developing diabetes.[1]

Intermediate Outcomes

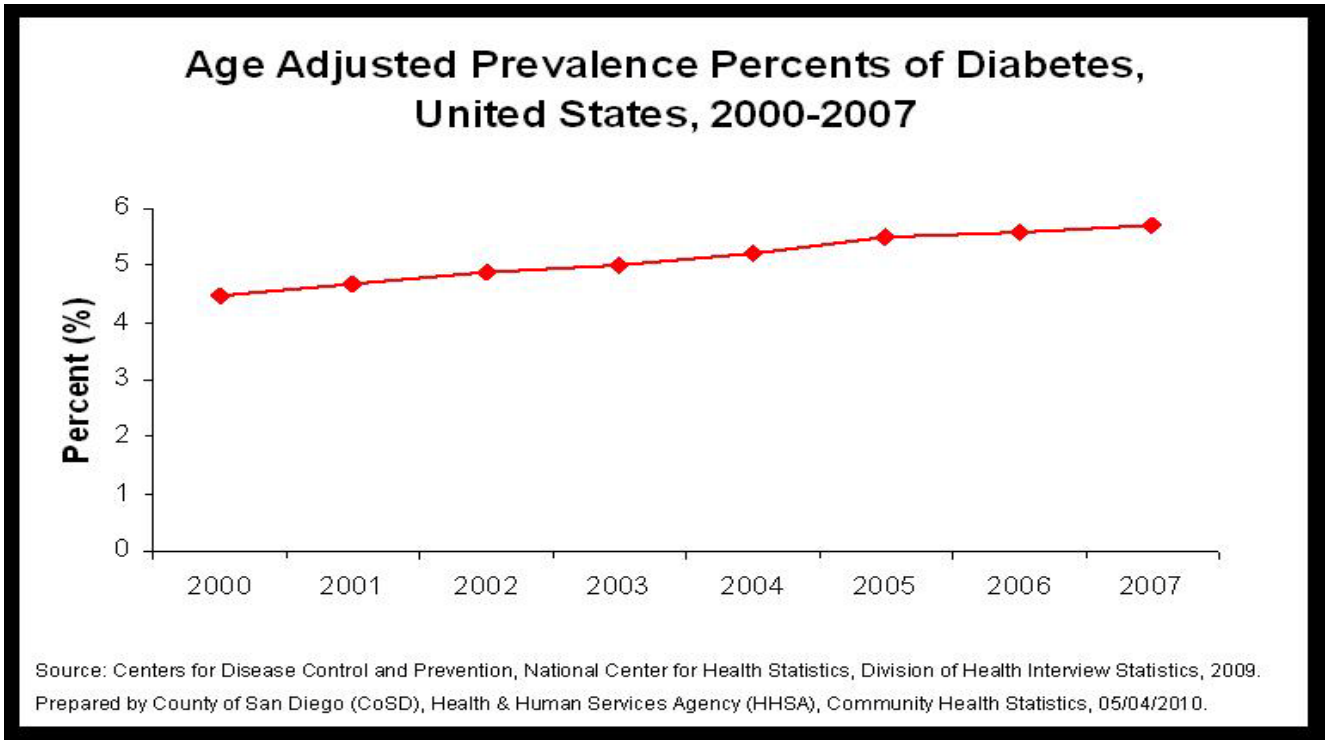
Diabetes increases the risk of other diseases and is accompanied by complications beyond acute glucose elevation. Some of these include:

- *Heart Disease*
  - Heart disease death rates for diabetic adults are 2 to 4 times higher than for non-diabetics.[3]
  - Nearly two-thirds of deaths among people with diabetes are due to heart disease and stroke.[1]
- *Hypertension (High Blood Pressure)*
  - In 2007, two-thirds (67%) of diabetic American adults reported having high blood pressure.[4]
- *High Cholesterol*
  - In 2007, nearly two-thirds (62%) of diabetic American adults reported having high cholesterol.[4]
- *Stroke*
  - Stroke was listed as the cause of death on 16% of all death certificates of diabetics aged 65 years and older in the United States in 2004.[1]
- *Eye Disease*
  - Diabetes is the leading cause of blindness in adult Americans aged 20-74 years.[1]
  - Diabetic retinopathy (changes in the blood vessels of the retina) accounts for 12,000 to 24,000 cases of blindness each year in the United States.[1]
- *Periodontal Disease*
  - People with diabetes are twice as likely to have gum disease as those without diabetes.[1]
- *Kidney Disease*
  - In 2005, diabetes accounted for 44% of new end stage renal disease cases in the United States.[1]
- *Lower Extremity Conditions*
  - About 60-70% of people with diabetes have some form of neuropathy (nerve damage).[1]
  - More than 60% of non-traumatic lower limb amputations are in diabetics.[1]
- *Infections*
  - Diabetics are more prone to infections such as influenza or pneumonia.[1]
- *Pregnancy Complications*

- Gestational diabetes can cause complications for the infant.[1]
- About 50% of women who have had gestational diabetes develop Type 2 diabetes, 5 to 10 years later.[1]

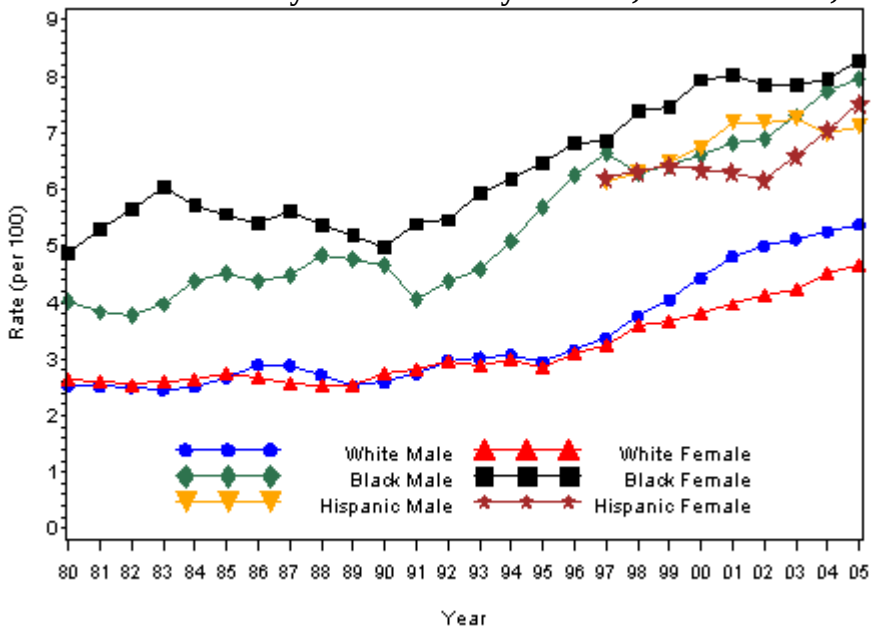
National Statistics and Disparities

Statistics



- From 2000-2007, the percentage of Americans currently with diabetes has risen.

Diabetes Prevalence by Race/Ethnicity and Sex, United States, 1980–2005*.[5]



*Diagnosed diabetes, age adjusted rates.
Data Source: Centers for Disease Control and Prevention, National Center for Health Statistics, Division of Health Interview Statistics, data from the National Health Interview Survey. U.S. Bureau of the Census, census of the population and population estimates. Data computed by the Division of Diabetes Translation, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention.

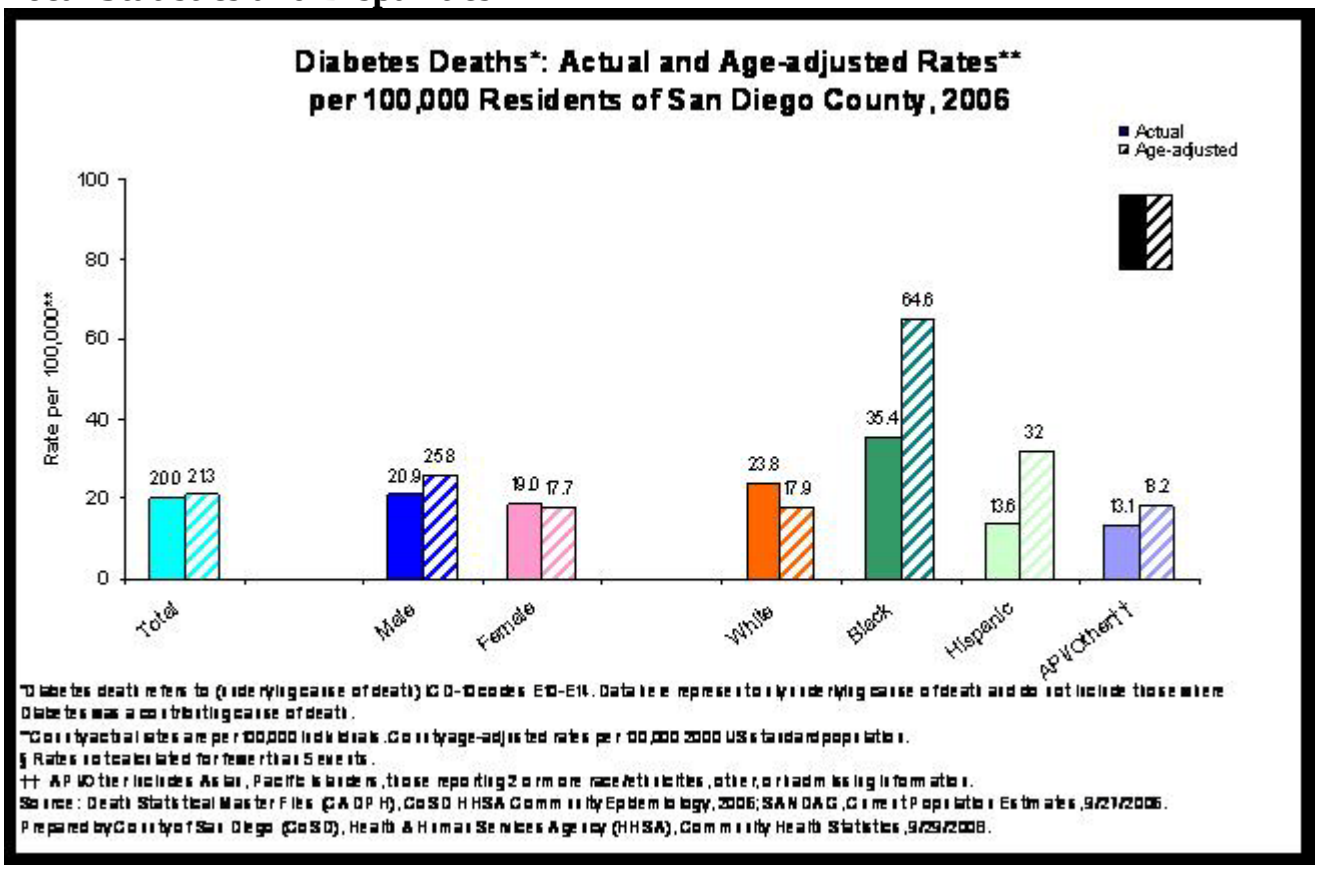
Disparities

- From 1980 through 2009, black females had the highest age-adjusted prevalence of diabetes in the United States.[5] Black and Hispanic males and females had higher prevalence rates of diabetes than whites of both genders.[6]
- In 2007, nearly 11% of Americans aged 20 years and older had diabetes, and nearly one-quarter (23%) of those age 60 years and older had diabetes.[6]

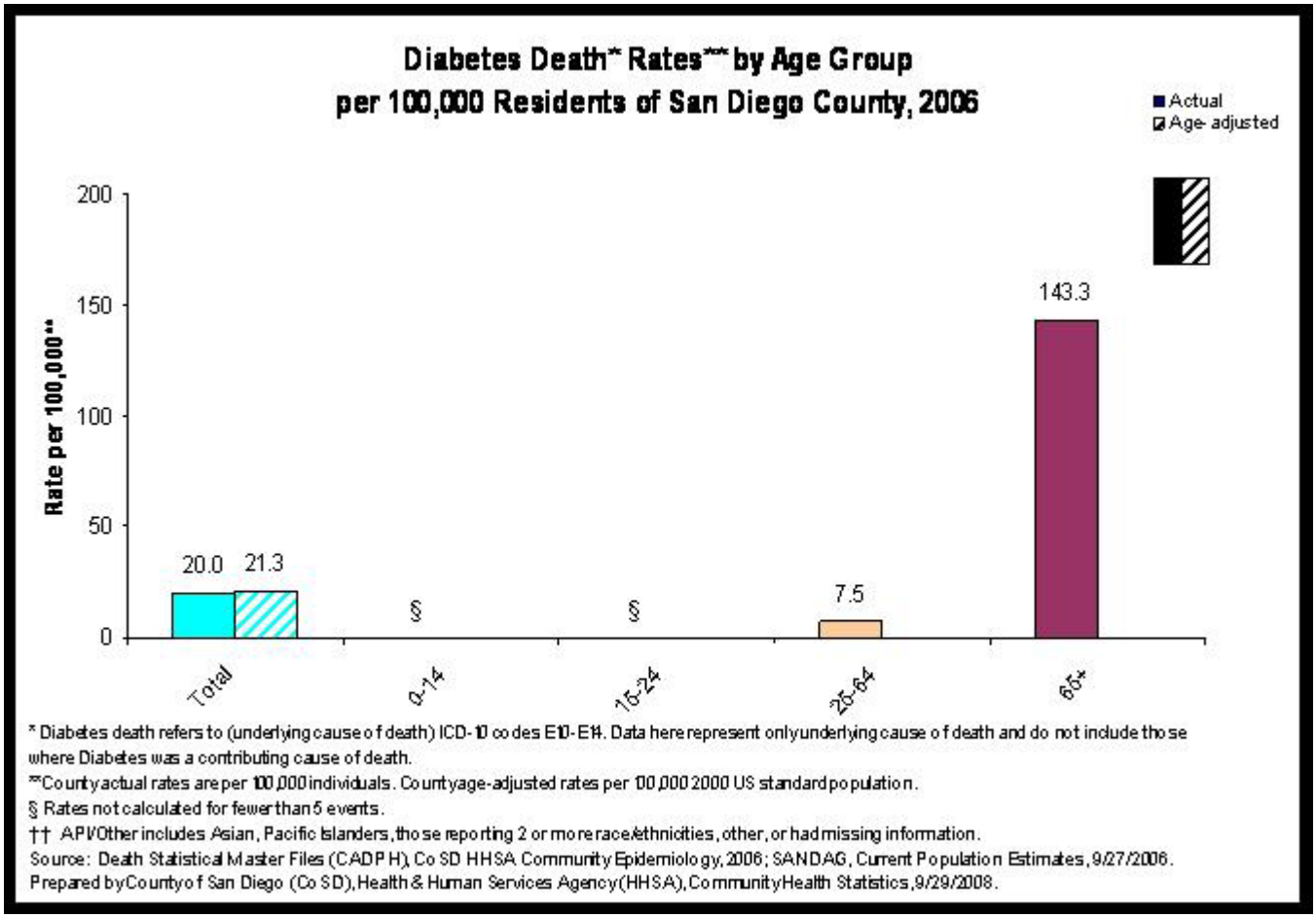
Cost

- In 2007, the United States spent $174 billion in direct medical costs ($116 billion) and indirect costs ($58 billion) such as lost productivity and disability payments.[6]

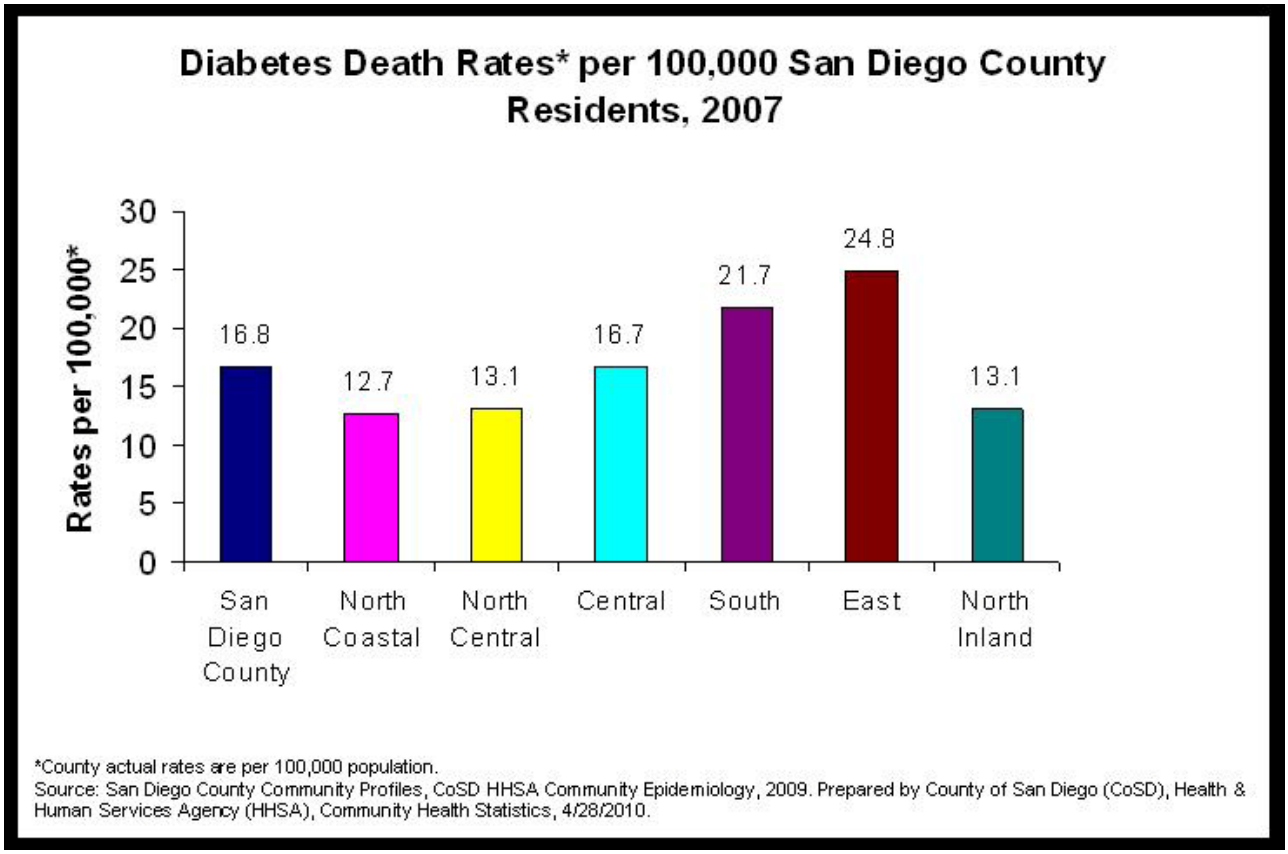
Local Statistics and Disparities



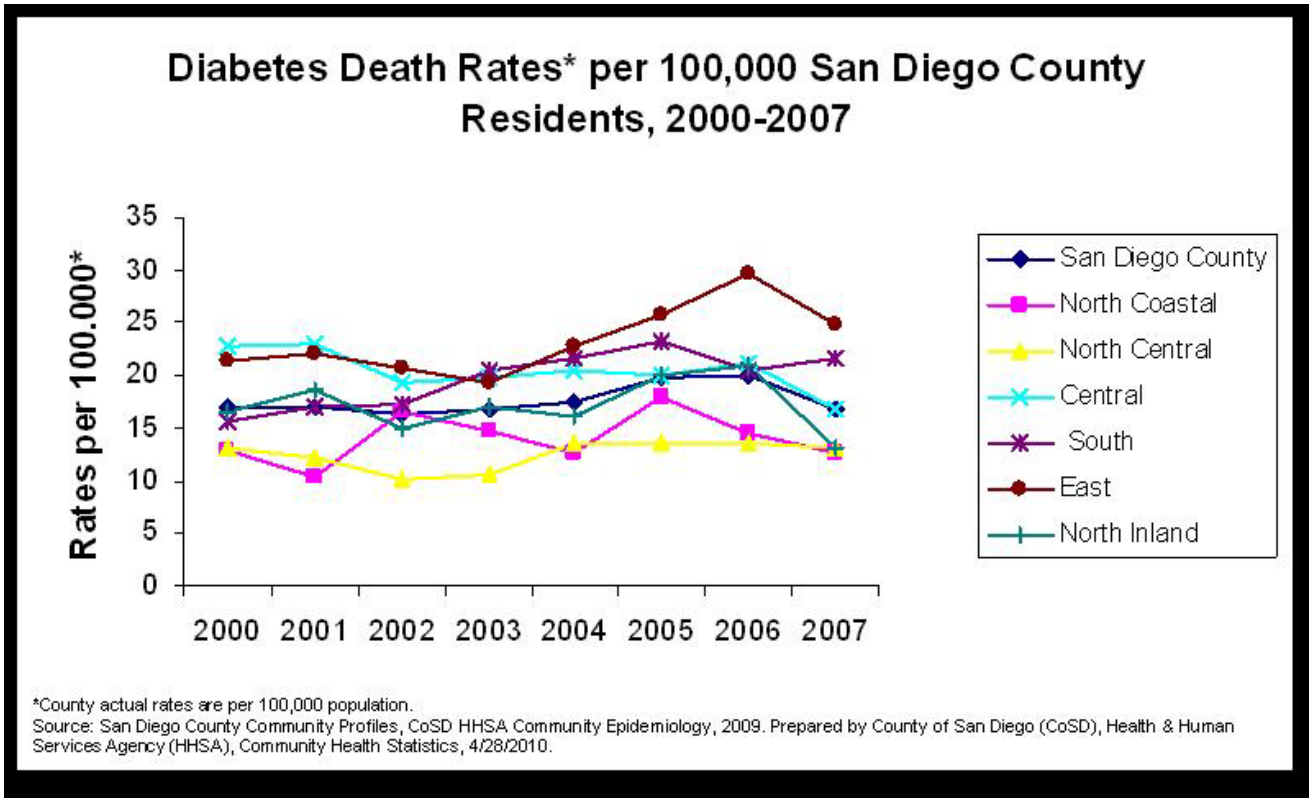
- The age-adjusted diabetes death rate among San Diego residents was 21.3 per 100,000 in 2006.
- Males had a higher death rate than females, 25.8 per 100,000 versus 17.7 per 100,000, respectively, in 2006.
- In 2006, blacks had the highest age-adjusted death rate (64.6 per 100,000), which was nearly double the next highest rate of 32.0 per 100,000 for Hispanics. White residents had the lowest age-adjusted diabetes death rate (17.9 per 100,000).



- The diabetes death rate was highest among San Diego County residents aged 65 years and older (143.3 per 100,000), which was 19 times higher than the death rate among residents aged 25-64 years (7.5 per 100,000) in 2006.



- In San Diego County, the highest diabetes death rates were found in the East and South regions of the county.



- The diabetes death rates over time vary for each region. However, the East region tends to have the highest rates from 2000-2007.

Diabetes and Its Complications: Prevention for Individuals

- *Control Blood Sugar*
  - Decreasing glucose levels decreases the risk of complications. Every 1% decrease in blood A1C levels (an indicator of blood sugar control) decreases the risk for eye, nerve and kidney diseases by 40%.[1]
  - Blood sugar can be controlled by planning healthy meals, monitoring glucose levels frequently, and medication.
- *Control Blood Pressure*
  - Controlling blood pressure can reduce the risk of heart disease and stroke by up to 50% and can reduce the risk of neuropathy, kidney disease, and eye disease one third.[2]
  - Blood pressure can be controlled by self-monitoring blood pressure levels, taking medications as recommended, managing stress, maintaining a healthy diet, and getting regular exercise.
- *Strive for a Healthy Weight*
  - Loosing excess weight, even small weight losses can be beneficial
  - For people with pre-diabetes, weight loss and regular exercise can reduce the onset of diabetes by more than 50% over a 3 year period.[2]
  - Weight loss can be achieved by maintaining a healthy diet and getting regular exercise.
- *Do Not Smoke*
  - Smoking raises blood pressure which effects eye, kidney and nerve disease.[2]
  - Smoking damages and constricts the blood vessels. This damage can worsen foot ulcers and lead to blood vessel disease and leg and foot infections.
  - Smokers with diabetes are more likely to get nerve damage and kidney disease.
- *See a Doctor Regularly to Monitor:*
  - Changes in blood glucose over time;
  - Kidney function;
    - Detecting and treating early diabetic kidney disease can reduce a decline in kidney function by 30-70%.[1]
  - Cholesterol & lipid levels.
- *Care for Feet*
  - Diabetes can damage nerves and blood vessels, resulting in reduced circulation and sensation necessary to identify injuries and infections. This can be prevented by:
    - Checking feet daily can help prevent the development of ulcers and possible amputation,
    - Protecting feet by wearing socks and comfortable, well-fitting shoes,
    - Avoiding the cold to prevent frostbite.
  - Comprehensive foot care programs can reduce amputation rates by 45-85%.[1,2]
- *Get Regular Dental Exams*
  - Maintain good oral health.
  - Brush and floss daily.
- *Get Yearly Eye Exams for Cataracts, Diabetes Retinopathy and Glaucoma*
  - Laser surgery and appropriate follow-up care can reduce the risk of blindness by 50-60% percent.[2]
  - People with proliferative retinopathy can reduce their risk of blindness with timely treatment and appropriate follow-up care.

- *Get Annual Influenza Vaccinations*
  - Diabetes can affect the immune system, slow healing and lead to flu complications.

Prevention Tools for Public Health Professionals: Diabetes Critical Pathway

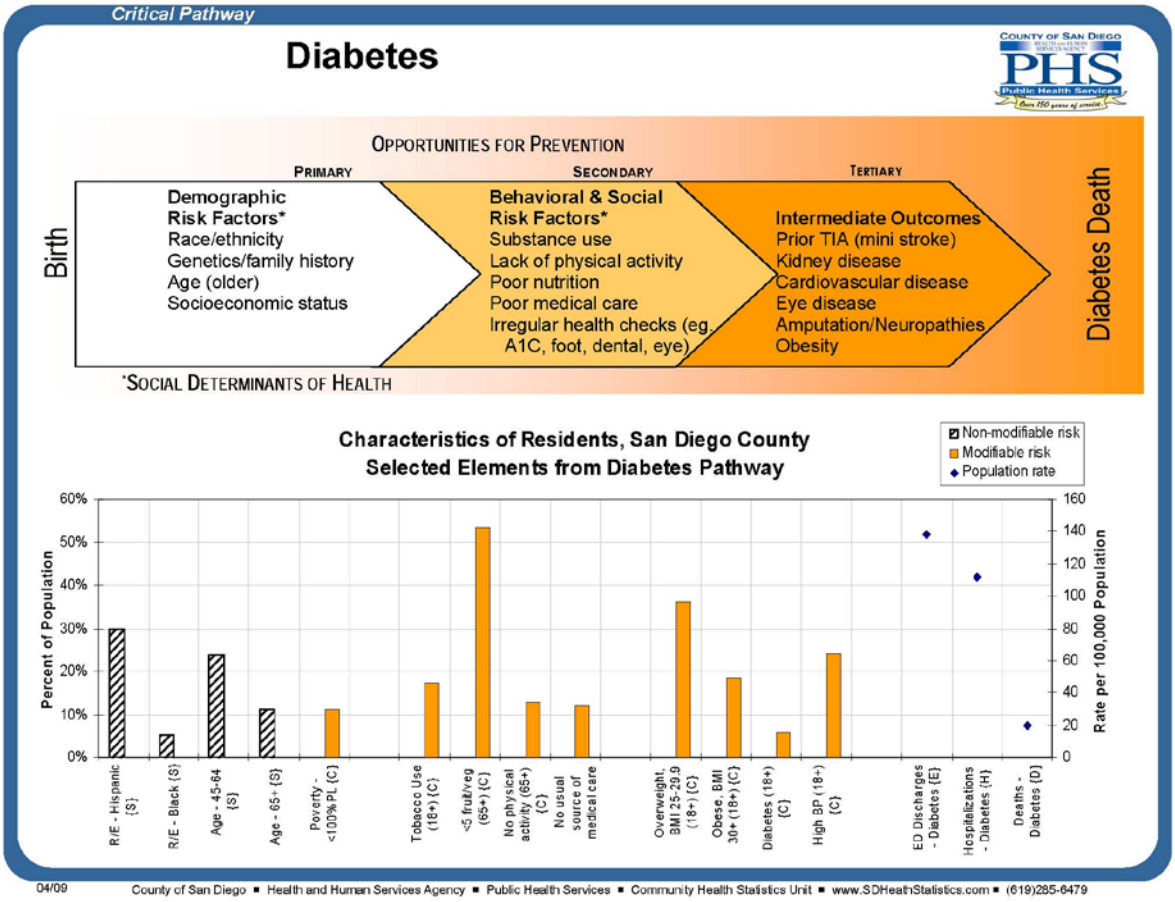
There are many opportunities for public health professionals in the community to help reduce the risk of diabetes and to improve the health outcomes of individuals who already have the disease. To assist in community health efforts, a *Diabetes Critical Pathway* was developed.

The *Diabetes Critical Pathway* is a tool to be used in health promotion and disease prevention efforts. Its purpose is to identify populations at greater risk for diabetes, and to identify prevention and early intervention opportunities. The *Diabetes Critical Pathway* displays a diagram of the major risk factors and intermediate outcomes or related diseases that have an impact on, or result from, diabetes. Risk factors are marked as non-modifiable (black striped bars) such as race/ethnicity or gender and modifiable (solid colored bars) such as physical activity or high blood pressure.

Beneath the risk factors diagram is a data grid describing the San Diego resident population in relation to selected elements of the pathway. The data grid is designed to assist in quick identification of opportunities for interventions that might have a high impact on a particular disease. The data represent all San Diegans, not only those with a particular disease. The left axis (bar) indicates the percent of the population with a known risk factor or intermediate outcome. The right axis (diamond) indicates the rate of a particular medical encounter within the population that is specified. The data are described fully described fully in the complete version of the *Critical Pathway*s.[7]

In addition, the Community Health Statistics Unit website (www.SDHealthStatistics.com) provides detailed demographic, health and facility data including maps of geographically formatted health data. Also available are links to other County data sources, state and national sites of interest. For further assistance with data or interpretation, please contact the Community Health Statistics Unit.

Diabetes Critical Pathway to Disease.



Data Sources

[1] Centers for Disease Control and Prevention. National Diabetes Fact Sheet: General information and National Estimates on Diabetes in the United States, 2007. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2007.
[2] U.S. Department of Health and Human Services, Center for Disease Control and Prevention. Preventing Chronic Disease: Investing Wisely in Health. Preventing Diabetes and Its Complications. http://www.cdc.gov/nccdphp/publications/factsheets/Prevention/pdf/diabetes.pdf. Revised August, 2008. Accessed May 4, 2010.
[3] Centers for Disease Control and Prevention. (2003). Self-reported heart disease and stroke among adults with and without diabetes — United States, 1999–2001. MMWR 52:1065-1070.
[4] Centers for Disease Control and Prevention.Diabetes Data and Trends, Risk Factors for Complications. http://www.cdc.gov/diabetes/statistics/comp/fig10.htm. Last updated July 21, 2009. Accessed August 4, 2009.
[5] Centers for Disease Control and Prevention, National Center for Health Statistics, Division of Health Interview Statistics. (2008). http://www.cdc.gov/diabetes/statistics/prev/national/figraceethsex.htm. Last updated July 23, 2009. Accessed May 4, 2010.
[6] National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health, National Diabetes Information Clearinghouse (NDIC). Diabetes Overview. NIH Publication No. 09-3873, November 2008. http://www.diabetes.niddk.nih.gov/dm/pubs/overview/index.htm#scope. Accessed August 4, 2009.
[7] County of San Diego Health and Human Services Agency, Public Health Services. Community Health Statistics Unit. (2009). Critical Pathways: the Disease Continuum, Diabetes. April, 2009. http://www.sdcounty.ca.gov/hhsa/programs/phs/documents/CHS-CriticalPathwaysofDisease7-3-09.pdf . Accessed July 16, 2009.